Register Number:

Date:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE – 27

B.Sc STATISTICS – I SEMESTER

SEMESTER EXAMINATION – OCTOBER 2019

ST 118: INTRODUCTION TO PROBABILITY AND STATISTICS

Time: 2½ hrs **Max: 70 Marks**

This question paper has **THREE** printed pages and **THREE** parts

SECTION – A

I Answer any FIVE of the following: 5 x 3 = 15

1. Explain primary and secondary data with an example.
2. Explain discrete and continuous variable. Which of the following variables are continuous?
   A) Number of children per family
   B) Average age of students of different classes
3. Define central tendency? and list out all measures of central tendency
4. What are partition values? Find D_8 from the data given below.
   71, 73, 93, 113, 112, 68, 84, 82, 109, 85, 96, 115, 79, 120, 76, 128.
5. Explain conditional probability with an example.
6. Define moment generating function (MGF) and give any two properties
7. Define covariance and write down range for it.

SECTION – B

II Answer any FIVE of the following: 5 x 7 = 35

8. (A) Draw Stem and Leaf diagram for the data given below. (3)
   147,117,101,149,105,93,98,112,124,142,135,148,115,107,99 126, 103,132,144,131
   (B) Explain different types of scales of measurement with an example for each type. (4)

9. (A) Define Harmonic mean. A cyclist pedals from his house to his college at a speed of 15 km per hour and back from the college to his house at a speed of 10 km per hour. Find the average speed. (Distance from house to college is 5 km) (4)
   (B) Explain graphical method of determining mode (3)

10. (A) Define Standard deviation. Prove that standard deviation is affected by the change of scale but not origin. (4)
    (B) Define coefficient of variation. The following table shows the result of an analysis relating to the prices of two shares X and Y that were recorded during the year 2015

Share	Mean	Variance
X	15	25
Y	20	16

Which of the two shares have more variability in price? (3)

11. (A) Define raw moments. Find the first two central moments if first two moments about origin are 2, 6 (5)

(B) Find median for a symmetric distribution with Q_1= 30 and Q_3= 50. (2)

12. (A) State and prove addition theorem of probability. (5)

(B) For any two events A and B, verify that $P(A \cap B^c) = P(A) - P(A \cap B)$ using Venn diagram (2)

13. (A) Let probability density of X is $f(x) = e^{-x}$, $x>0$. (4)
Find the probability density of Y =2X

(B) Define (i) Random variable and (ii) Probability mass function (3)

14. Two random variables X and Y have the following joint density function

$$f(x,y) = \begin{cases} (2-x-y), & 0 \le x \le 1, 0 \le y \le 1 \\ 0 & , \quad \text{otherwise} \end{cases}$$

Find

A) Marginal probability density of X B) E(Y) (3+4)

SECTION – C

III Answer any TWO of the following: 2 x 10 = 20

15. (A) Sum of deviations of a set of *n* values measured from 50 is -10 and sum of deviations of same set of n values measured from 46 is 70. Find n and mean (4)

B) Define Geometric mean. Prove that Geometric mean capable of further algebraic treatment. (3)

C) Define Scatter diagram. Explain different types of correlation with diagram. (3)

16. (A) Define distribution function. Mention its properties. (4)

B) Differentiate between classical and empirical definitions of probability (3)

C) Define statistics. Mention any limitations of statistics (3)

17. (A) According to a past data 10% of patients entering a clinic have liver disease and 5% of the clinic's patients are alcoholics. Among those patients diagnosed with liver disease, 7% are alcoholics. Find the probability of an alcoholic patient having liver disease (5)

B) Prove that Cov (aX, bY)= ab Cov(X, Y) (3)

C) Define skewness (2)